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(71) Applicant: MOTOROLA, INC. [US/US]; 8000 West Sunrise Blvd., Ft. Lauderdale, FL 33322 (US).

(72) Inventor: MOORE, Morris, A. ; 13707 Barberry Drive, Wellington, FL 33414 (US).

(74) Agents: NICHOLS, Daniel, K. et al.; Motorola, Inc., Intellectual Property Dept., 8000 West Sunrise Blvd., Ft. Lauderdale, FL 33322 (US).

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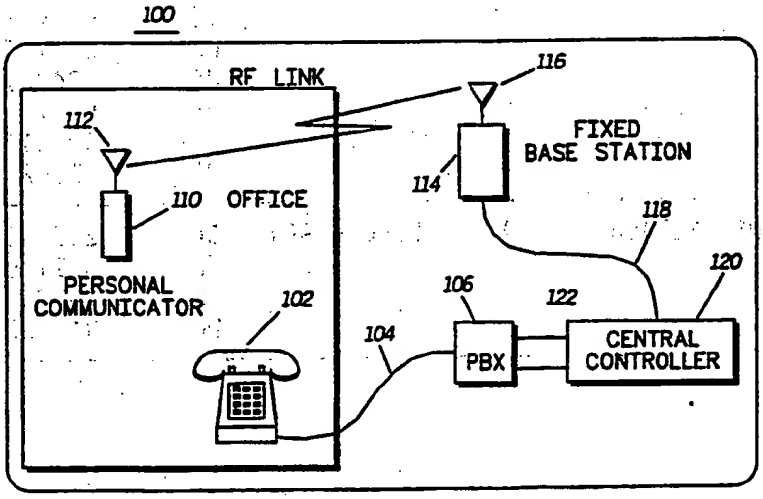
(54) Title: METHOD AND APPARATUS FOR SELECTIVE TRANSFER OF CALLS IN PERSONAL COMMUNICATORS



(57) Abstract

A communication system (200) for receiving and transmitting voice communications is disclosed. Voice communications are processed by a controller (206) and submitted to a base station (114) for transmission to a personal communicator (110). The receipt of a voice communication by the personal communicator (110) is indicated to the user by an alert tone. The user may select to answer these voice communications or simply transfer them to other communication devices (202, 208, or 212) using prestored numbers coreresponding to such devices. The transfer request may be via a keypad or a voice recognizer on board the personal communicator (110). A data signal is transmitted by the personal communicator (110) to the base station (114) in response to such a transfer request. This data signal is routed to the controller (206) upon reception by the base station (114). The controller (114) decodes the transfer request and routes the voice communication to the appropriate communication device (202, 208, or 212) via the base station (114).

METHOD AND APPARATUS FOR SELECTIVE TRANSFER OF CALLS IN PERSONAL COMMUNICATORS

Technical Field

This invention relates generally to personal communicators and is more specifically related to the use of such personal communicators with other communication devices and is particularly directed towards the transfer of incoming voice communications from a personal communicator to other communication devices.

Background

With the advent of personal communicators more people can enjoy being reached and reaching others without having to be at their desk or near a phone in their home. However, as such devices gain more wide spread acceptance, less traffic can be tolerated particularly in the more congested areas such as one's office. Consequently, users may want to refer back to their wired phones whenever possible without the loss of "on the move" contact. The additional features and the more comfort oriented ergonomics of a regular office or home telephone are other reasons for preferring to use such phones instead of a personal communicator.

A means to tie together personal communicators and wired telephones is by providing a cradle which can receive and hold

the personal communicator. Interfacing with the circuitry of the personal communicator, the cradle is used only as a converter to convert the ergonomics of the personal communicator to that of the wired telephone. The communication to the personal communicator is still provided for by the use of radio waves. Such use of the radio waves continues to congest the spectrum and subsequently rendering no improvements to the system throughput. Furthermore, it can be seen that while such a device converts the personal communicator to a regular wired phone it does not use the network wired telephone system and therefore, it does not take benefit of the vast signal processing capabilities of such a network.

An example of one such device used in other communication applications is a Convertacom® vehicular adaptor. A Convertecom® unit converts a portable communication transceiver into a mobile unit by using the electronics of the portable transceiver. Another major impediment to such an approach is the tendency to leave the personal communicator in the cradle and thereby reducing the effectiveness of "on the move" contact.

While personal communicators will be ideal for "people on the move", people are not always on the move and current desk phones with associated wire line networks may be preferred when people are in their offices or homes. A need clearly exists for a way to reduce the air traffic congestion of the personal communicator systems without the loss of "on the move" contact so desirable in such systems.

Summary of the Invention

Briefly, according to the invention, a personal communicator having a receiver for receiving voice communication and a transmitter for transmitting voice communication is disclosed. Coupled to the receiver is an indicator circuit for indicating to the user that a voice communication has been received. Upon receiving an indication of a voice communication, the user may select to either answer

the incoming voice communication or transfer it to another communication device. The transmitter is coupled to a circuit designed to receive the selective actuation of the user's request to transfer the incoming voice communication. Upon receiving such actuation, the transmitter proceeds to transmit a data signal to a base station requesting the transfer of the incoming voice communication to another communication device.

Brief Description of the Drawings

Figure 1 is a block diagram of a telephone system showing a network wired telephone along with a personal communicator along with their associated base stations in accordance with the present invention.

FIG. 2 is a block diagram of a communications system in accordance with the present invention.

FIG. 3 is a flow chart of the operation of the communication system in accordance with the present invention.

FIG. 4 is a diagram of a personal communicator in accordance with the present invention.

FIG. 5 is a diagram of the working blocks of a personal communicator in accordance with the present invention.

Detailed Description of the Preferred Embodiment

FIG. 2 shows a block diagram of a communication system 200 in accordance with the present invention. The communication system 200 is comprised of a personal communicator (PC)110 with its associated antenna 112, a base station 114 and its associated antenna 116, a controller 206, and one or a plurality of communication devices (CD) 202, 208, and 212 for transmitting and receiving voice communications via antennas 204, 210, or wire line 214 respectively. The communication devices may be other personal communicators or network wired telephones. A controller 206 is coupled to the base station 114 to provide the communication systems 200 with additional processing and memory power.

The communication between the CD 202 and the base station 114 may be accomplished via cables such as those used in the conventional telephone systems. Furthermore the controller 206 may be a conventional telephone system central controller.

Transmissions originated by the PC 110 are received by the base station 114 via the antenna 116. The base station 114 decodes the received signals and subsequently routes them along with extracted control information to the controller 206. The controller 206 acts upon these signals and routes them accordingly. Similarly signals transmitted by the CD 202, 208, or 212 are processed by the controller 206 and routed appropriately. Voice communications from other systems intended for the PC 110 or the CD 202 are once again handled by the base station 114 and the controller 206. To further illustrate the elements of the present invention, reference is made to the following description of a telephone system 100 which is one specific example of a communication system 200.

Referring to FIG. 1, a block diagram of a telephone system 100 is shown in accordance with the present invention. The system is comprised essentially of a personal communicator (PC) 110, a network wired telephone (phone) 102, a base station 114, a central controller 120, and a main switch box 106. The phone 102 is coupled to a main switch box 106 via the signal line 104. Calls placed by the phone 102 are processed by the main switch box 106 and routed to a central controller 120 via the signal line 122. Calls intended for the phone 102 take the same path in reverse. The operation of telephone networks is well known to those skilled in the art.

The communication path between the PC 110 and the base station 114 is established via antennas 112 and 116 respectively. The PC 110 originates and receives calls in the same fashion as a regular telephone except that it does so using radio frequencies. Several features may be available in the PC 110, however reference will only be made to those pertaining to the present invention. One such feature is the storing of numbers.

Several numbers corresponding to other communication devices may be pre-stored in the PC 110 for future references.The base station 114 is coupled tc a central controller 120 via control lines 118. This configuration ties the phone 102 and the PC 110 to the extensive global telephone network.

All phone calls are received and processed by the central controller 120 and routed to the appropriate destination. Phone calls intended for the PC 110 are submitted to the fixed base station 114 by the central controller 120. The fixed base station 114 transmits an alert signal to the PC 110 indicating to the user that an incoming voice communication is waiting to be answered. This alert signal is decoded by the receiver of the PC 110 and routed to an indicator circuit for presentation to the user. At this point the user generally proceeds to answer the incoming voice communication. However, under certain circumstances the user of the PC 110 may select not to answer the incoming voice communication and rather transfer it to his phone 102 or any other pre-stored number corresponding to other communication devices. In such situations the user actuates the transfer by pressing a transfer button or entering a sequence of keys on the keypad. The PC 110 may even be so designed to have voice recognition on board and be capable of receiving a voice command from the user as an indication to transfer the voice communication. Any of these actuations results in the transmission of a data signal by the transmitter of the PC 110 to the fixed base station 114 requesting the transfer of the incoming voice communication. The transmitted data signal can be digital code, a tone or a combination thereof.

The fixed base station 114 communicates this transfer request to the central controller 120. The central controller 120 analyzes the transfer request to determine the desired destination namely phone 102. Upon such analysis the central controller 120 routes the voice communication to the main switch box 106 which in turn routes the voice communication to the phone 102. Once the transfer request has been received by the central controller

120, the voice communication is treated as any other telephone call in a network wired telephone system.

The transfer of an incoming voice communication may be actuated after it has been answered by following the same actuation methods presented above. Indeed, in some situations the user may have no choice but to answer the incoming voice communication. One such situation is when the user is not right at his wired phone.

Referring now to FIG. 3 a flow chart of the operation of the PC 110 is shown in accordance with the present invention. From the start block 302 the PC 110 is monitoring the airwaves by the monitor block 304. The receiver of the PC 110 is on and open to incoming signals. The monitor block 304 is followed by a decision block 306 which determines if a voice communication has been received. The NO output of the decision block 306 is routed back to the monitor block 304. The PC 110 continues to operate in this loop until such time that a voice communication has been received. The YES output of the decision block 306 is connected to the indicate receipt of voice communication block 308. This block 308 informs the user of a received voice communication using alert tones, light emitting devices, mechanical vibrators, etc.

At this point the operator of the PC 110 may select to transfer the voice communication to a pre-stored telephone number before answering the voice communication. This condition prevails in situations where the operator is in his (her) office or home and prefers the ergonomics and/or features of his (her) desk or home telephone. Other situations are necessitated by the congestion of the frequency spectrum. The decision to transfer the voice communication is made at a decision block transfer voice communication 310 which is connected to the output of the indicate receipt of voice communication block 308. The NO output of the block 310 is connected to an answer voice communication block 312. At the answer voice communication block 312 the user of PC 110 proceeds to respond to the voice communication. Upon completion of the voice communication the

PC 110 reverts back to the monitor block 304 once again monitoring the channel for incoming signals. The YES output of the decision block 310 is connected to a request to transfer block 314. This block is accomplished by the user of the PC 110 pressing a single push button, entering a predetermined sequence of keys on the keypad, or perhaps using a voice command. Any of these actuations command the PC 110 to send a request to transfer signal to the fixed base station 114.

The base station 114 processes the transfer request and generates a command to the central controller 120. Request to transfer block 314 is followed by a transfer voice communication block 316. At this point the central controller 120 transfers the incoming voice communication to the directed destination namely the phone 102 via the main switch box 106. The destination address of the phone to where the voice communication is being transferred is preferably stored at the fixed base station 114. Once the voice communication has been transferred the operation returns to the monitor mode ready for processing another voice communication.

Referring to FIG. 4 a PC 110 is shown. The keypad 430 or the push button 410, among other things, is used to actuate the transfer of an incoming voice communication. The antenna 112 receives and transmits voice communications. Speaker 420 is used to indicate to the user the receipt of incoming voice communications. The speaker 420 is also used to present to the user the voice communication received by the antenna 112 and demodulated by the internal receiver circuits of the PC 110.

Referring now to FIG. 5 a block diagram of a PC 110 is shown. Incoming voice communications are received by an antenna 512 and routed to a receiver 518 via an antenna switch 510. The receiver 518 demodulates the incoming voice communication signals and presents data regarding such signals to the controller 508. The controller 508 routes a signal to an indicator 516 directing it to indicate to the user the receipt of a voice communication. The indicator 516 may provide such indication to the user via an alert tone applied to a speaker or a

transducer. The use of light emitting devices or vibrators provides such indication visually or mechanically respectively.

Upon notification, the user may select to answer the incoming voice communication using the PC 110 or simply transferring it to another communication device. The earlier may be accomplished by the press of an answer button on a keypad 504. The later similarly uses the key pad 504 in the following fashion. Using the keypad 504 the user normally has pre-stored several numbers corresponding to other communication devices in the memory device 502. In order to actuate the transfer of the incoming voice communication, the user presses a single key or enters a sequence of keys corresponding to other communication devices on the keypad 504. The interaction of the keypad 504, the controller 508, and the memory block 502 determines the destination of the transfer. Upon such determination the controller 508 routes a data signal to the transmitter 506. The transmitter 506 transmits this data signal which contains transfer request and destination information to the base station 114 via the antenna switch 510 and antenna 512.

The actuation to transfer the incoming voice communication to another communication device may be accomplished via voice using voice recognizer 505 in conjunction with the controller 508. The voice command requesting the transfer is decoded by the voice recognizer 505 and submitted to controller 508 for further processing. The controller 508 determines the destination and routes a data signal to the transmitter 506 containing transfer request and destination information. The operation of the voice recognition systems is well known to those skilled in the art and is therefore avoided here.

Those skilled in the art appreciate the vast differences that may prevail in communication devices of the same kind including the PC 110. Furthermore the operation of personal communicators and specifically the PC 110 may vary greatly in different systems without deviating from the principles of the present invention. Therefore the presentation of the working

block of the PC 110 and the operational blocks 300 should be construed only as an example (and not as a limitation) in clarifying the preferred embodiment of the present invention.

What is claimed is:

Claims

1. A wireless personal communicator, comprising;

receiving means for receiving voice communications;

transmitting means for transmitting voice communications;

indicating means coupled to said receiving means for indicating the receipt of received calls; and

actuating means coupled to said transmitting means for selectively actuating transmission of a data signal to a base station for transferring said received voice communications to another communication device.

2. The wireless personal communicator of claim 1, further including storing means for storing numbers corresponding to other communication devices.

3. The wireless personal communicator of claim 1, wherein said transferring means includes means for selectively transferring said received voice communications using a pre-stored number corresponding to said another communication device.

4. The wireless personal communicator of claim 1, wherein said transferring means includes means for selectively transferring said received voice communications before answering said received voice communications by said wireless personal communicator.

5. The wireless personal communicator of claim 1, wherein said actuating means includes a single button.

6. The wireless personal communicator of claim 1, wherein said actuating means includes a keypad, and is responsive to a pre-determined sequential actuation of said keypad.

7. The wireless personal communicator of claim 1, wherein said actuating means includes a voice recognition system responsive to voice commands.

8. A communications system for receiving and transmitting voice communications, comprising;

a plurality of communication devices including at least one wireless personal communicator;

transferring means for selectively transferring said received voice communications by said wireless personal communicator to another of said communication devices before answering said calls.

9. The communications system of claim 8, wherein said wireless personal communicator further comprises;

indicating means coupled to said receiver for indicating the receipt of received calls to a user; and

actuating means coupled to said transmitter for actuating transmission of a data signal to a base station for transferring said received calls to other communication devices.

10. A method for processing incoming voice communications to a wireless personal communicator, comprising the steps of;

indicating the receipt of an incoming voice communication at said wireless personal communicator;

actuating transmission of a data signal by the wireless personal communicator to a base for transferring said voice communication to another communication device.

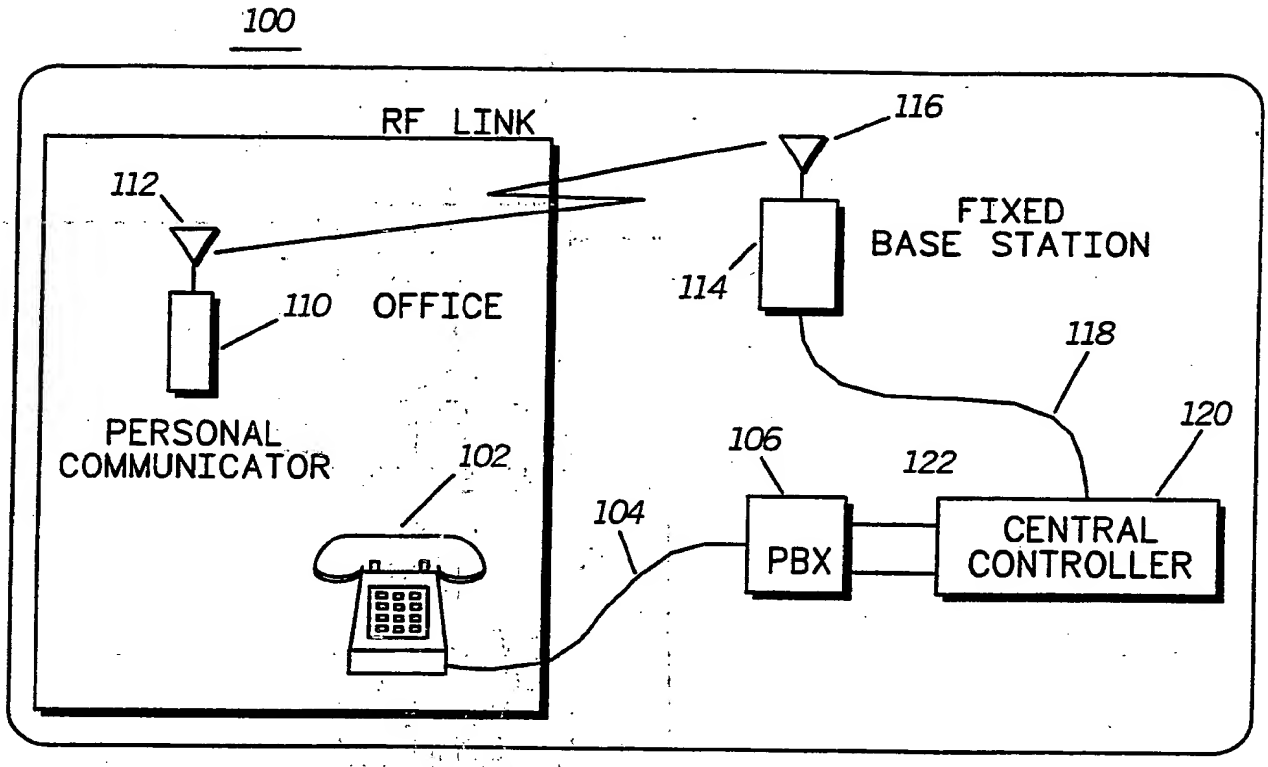


FIG.1

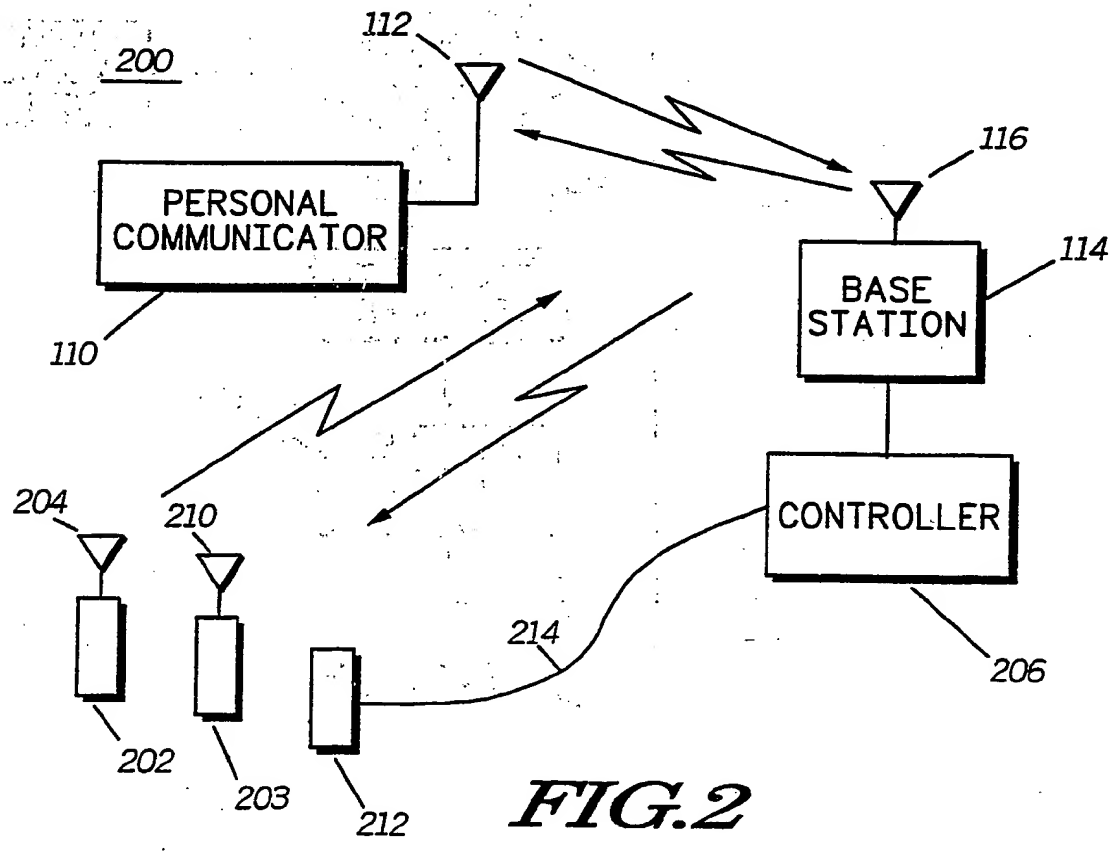


FIG.2

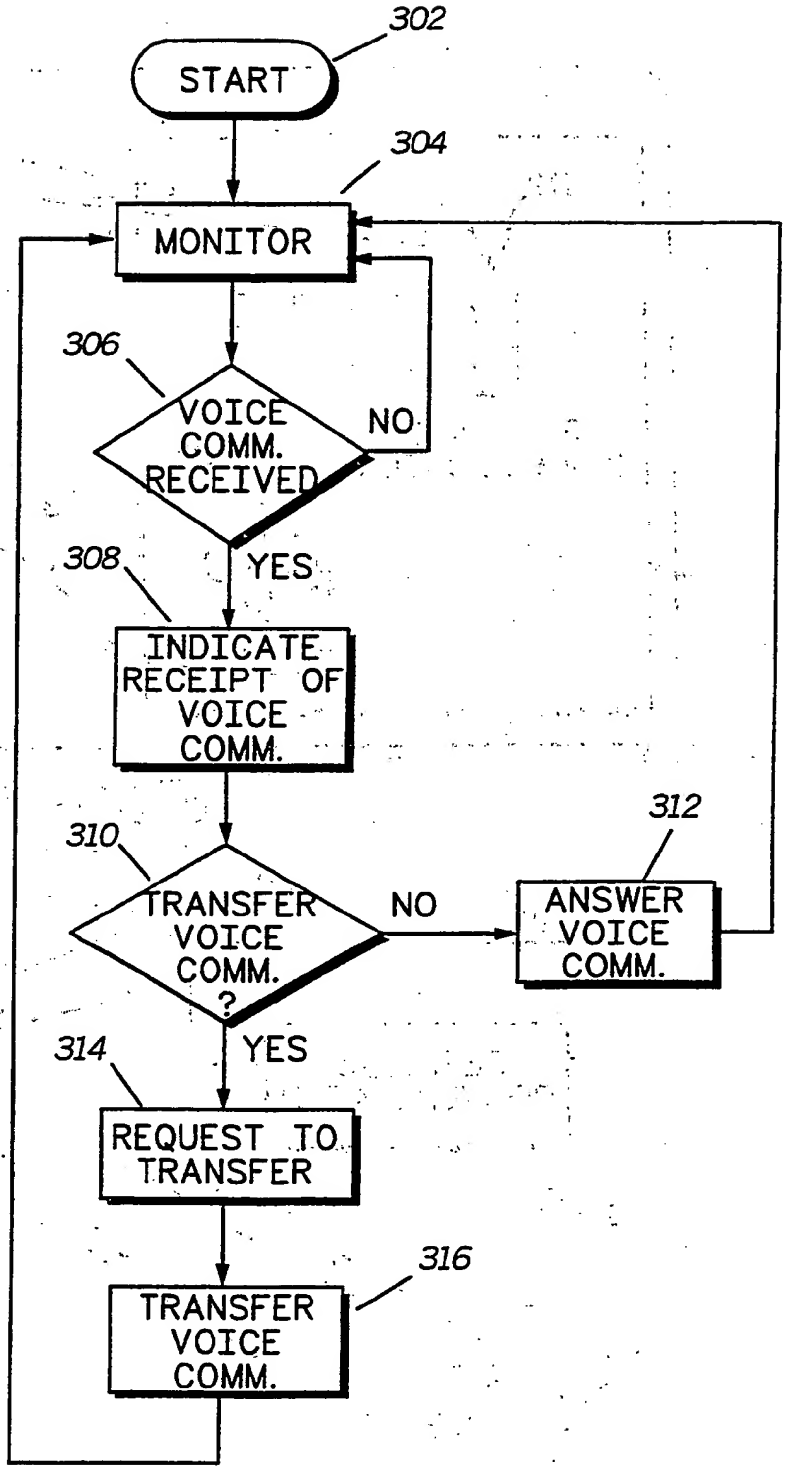

302
START
304
MONITOR
306
VOICE COMM. RECEIVED
NO
YES
308
INDICATE RECEIPT OF VOICE COMM.
310
TRANSFER VOICE COMM. ?
NO
312
ANSWER VOICE COMM.
YES
314
REQUEST TO TRANSFER
316
TRANSFER VOICE COMM.

FIG. 3

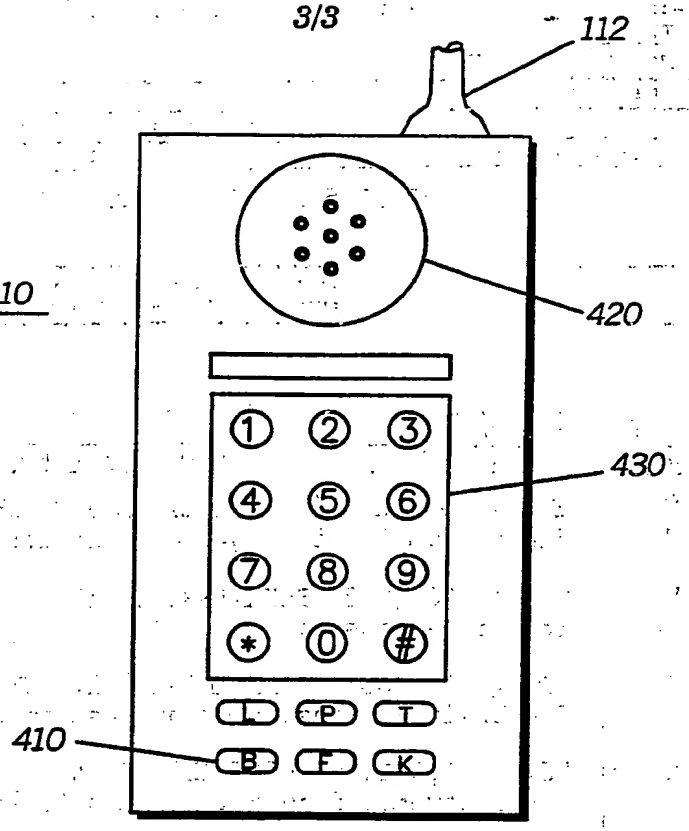


FIG.4

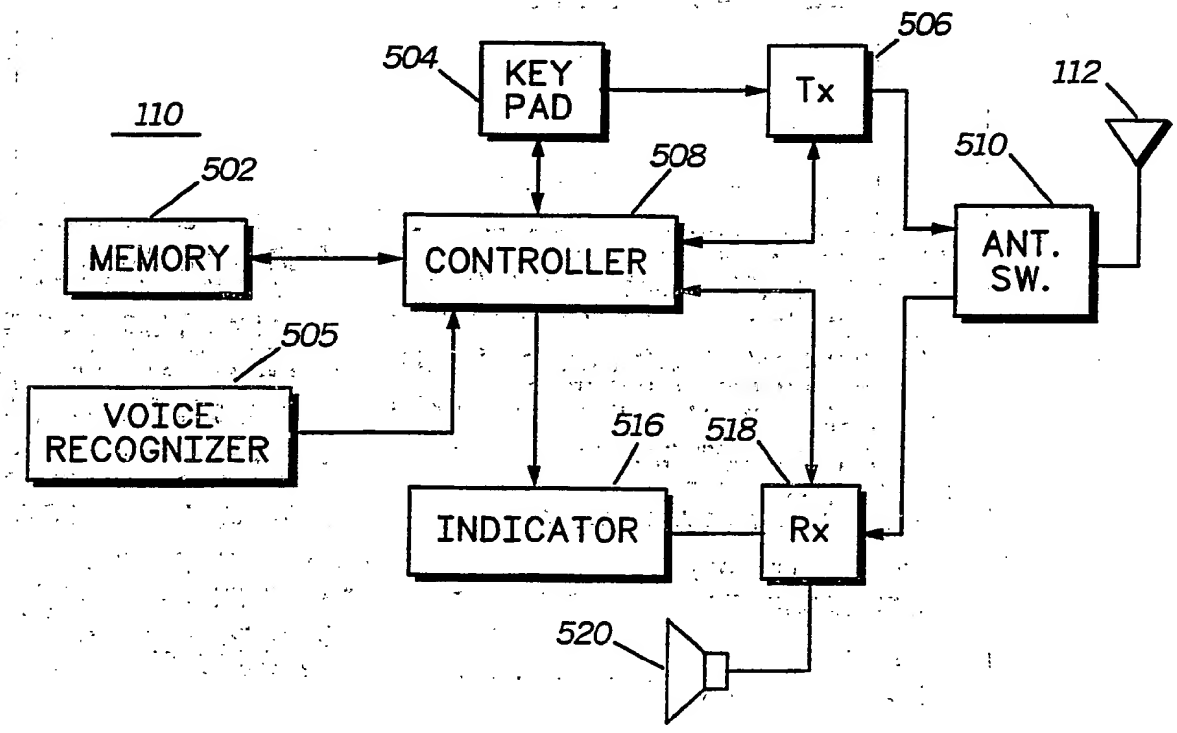


FIG.5

INTERNATIONAL SEARCH REPORT

International Application No PCT/US91/06321

I CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC(5): H04M 11/00
US CL : 379/58,211

II FIELDS SEARCHED

Minimum Documentation Searched

Classification System	Classification Symbols
U.S.	379/57,58,61,63,201,211,212

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched

III DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X Y	EP, A, 294,233 (MORATA ET AL.) 07 DECEMBER 1988 See column 1, lines 34-54, abstract	1,6,10 2-5,7
Y	EP, A, 307,193 (SAKANISHI ET AL.) 15 MARCH 1989 See title, abstract.	7
Y	JP, A, 62-140592 (FUJIHASHI) 24 JUNE 1987 See English translation of abstract.	7
X	US, A, 4,941,167 (CANNALTE ET AL.) 10 JULY 1990 See abstract, figure 1, column 4, lines 26-65.	8,9
Y	US, A, 4,723,273 (DIESEL ET AL.) 02 FEBRUARY 1988 See abstract; column 1, lines 62-63; column 2, line 17-19; column 5, lines 40-49, 56-59; column 6, lines 7-12; figure 2.	1-10

* Special categories of cited documents:

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
23 OCTOBER 1991	14 NOV 1991
International Searching Authority	**Signature of Authorized Officer**
ISA/US	DWAYNE BOST

Form PCT/ISA/210 (second sheet) (Rev. 11-87)

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